Department of Defense
Health Care Provider's Briefing

SMALLPOX

Version: 27 Dec 02

Purpose

- **Purpose of this briefing is to prepare health-care providers to understand smallpox vaccination**

- **Refer to DoD Smallpox Response Plan (www.vaccines.army.mil/smallpox.asp) for information about:**
  - **Surveillance for fever-rash illness**
  - **Epidemiologic response (contact tracing)**
  - **Other smallpox issues**

Key Messages

1. **Smallpox would disrupt military missions, because it is contagious and deadly**
2. **Smallpox vaccine prevents smallpox, but requires very careful use**
3. **Preserving the health and safety of our people are our top concerns**
4. **Smallpox protection helps our War on Terrorism: New threats require new measures of force protection**

Threat

1. Smallpox would disrupt military missions, because it is contagious and deadly

- **Smallpox is a contagious disease that spreads from one person to another**
- **Before smallpox was eradicated, it killed many millions of people over hundreds of years**
- **Terrorists or governments hostile to US may have or could obtain variola virus**
- **A smallpox outbreak would significantly affect military readiness**

Smallpox

Threat to Fighting Forces

- **A smallpox outbreak would significantly degrade combat mission capability, because almost all troops are susceptible**
- **An outbreak could restrict movement of troops, aircraft, ships**
- **Smallpox would stress medical operations to maximum capacity**

Epidemiology of Smallpo

- **Smallpox was once worldwide in scope and was declared eradicated from the Earth in the 1980**
- **Smallpox spreads primarily by prolonged (~ 1 h) face-to-face contact**
  ~ 15 days between generations of smallpox cases.
- **Smallpox cases infected 3 to 5 other people (average), 58% of household contacts**
- **A smallpox patient is most infectious from onset of rash, marked by temperature > 101F (38.8C)**
- **As scabs formed, infectivity decreased rapidly.**

There were two primary forms of the disease:

- **Variola major: 30% lethality**
- **Variola minor (alastrim): 1 % lethality**

Pathogenesis

- **Natural infection occurs after virus implants on oropharyngeal, respiratory mucosa**
- **Infectious dose unknown, but believed to be only a few virions**
- **Virus migrates and multiplies in regional lymph nodes**
- **Symptomatic viremia develops on day 3 or 4**
- **Secondary viremia begins on 8th day, followed by fever & toxemia**
- **Virus localizes in small blood vessels of dermis and infects adjacent cells**

Smallpox Infection Timeline

Post-exposure vaccination fully or partially protective through day 3 after exposure.

Average smallpox case infects 3 to 5 people. About half of close contacts are infected.

First symptoms develop 7 to 17 days after exposure; average depicted here as day 11.

After symptoms develop, isolate case. Trace and vaccinate contacts.

Communic-ability	Exposure = Day 0	Symptoms	Day of Symptoms	Disease Progress
Not contagious	Day 1	No symptoms		Virus introduced to respiratory tract
	2			
	3			
	4			Virus appears in lymph nodes
	5			
	6			Virus replicates in lymph system
	7			
	8			
	9			
	10			
	11	First symptoms	Day 1	
	12		2	Fever, backache, headache, nausea, malaise
Contagious	13		3	
	14		4	
	15	Rash	5	Macules (spots)
Very contagious	16		6	Papules (bumps, pimples)
	17		7	
	18		8	
	19		9	Vesicles (blisters)
	20		10	
Contagious	21		11	Pustules (pus-filled blisters)
	22		12	
	23		13	
	24		14	
	25		15	Scabs
Scabs contagious	26		16	
	27		17	
	28		18	
	29		19	
	30		20	
Not contagious	31		Scars	
	32			

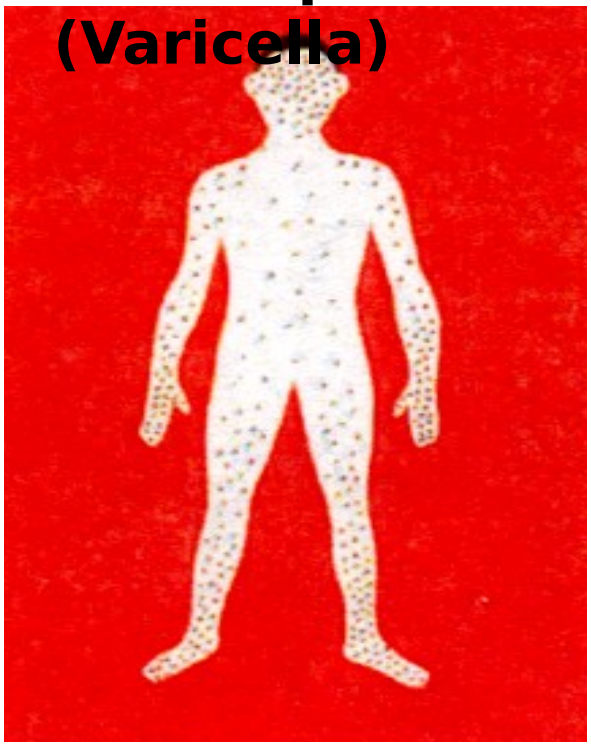
Smallpox

Diagnosis of Smallpox

- **One case of smallpox must be treated as an international health emergency**
- **Characteristic rash:**
  - **Centrifugal in distribution**
  - **Most dense on face and extremities**
- **Smallpox was seldom suspected until more cases appeared and outbreak recognized**
- **Early cases: laboratory confirmed**
- **Later cases: clinical diagnosis**

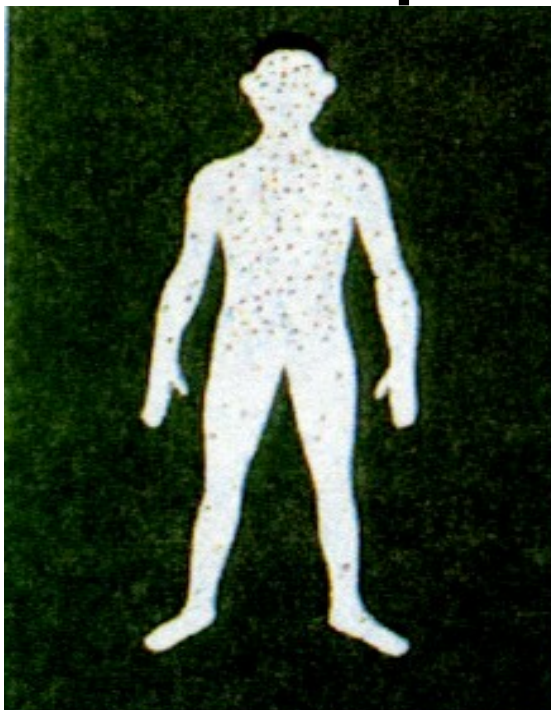
Differential Diagnosis

Smallpox (Varicella)



- **Lesions appear in 1-2 day period**
- **On any part of body, lesions in same stage of development**

Chickenpox



- **New lesions appear in crops every few days**
- **Lesions at different stages of maturation**
- **More lesions on trunk than face and extremities**

Care of Smallpox Patient

- **Supportive therapy helps reduce fever, pain, etc. But no established treatment for smallpox**
- **Smallpox vaccination up to 3 days <u>after</u> someone is exposed to smallpox virus will prevent or reduce the severity of smallpox in most people**
- **Vaccination 4 to 7 days after exposure likely offers partial protection**
- **Cidofovir proposed to treat smallpox, but no human efficacy data**

Smallpox Vaccine in History

- 1776: Smallpox: US forces too weak to capture Quebec!
  - 5,500 smallpox casualties out of 10,000 forces
  - George Washington orders variolation of Continental Army against smallpox (archaic procedure, 2% fatal)
- 1796: Edward Jenner uses cowpox virus from milkmaid to prevent smallpox in a young boy
- 1812: War Dept orders Jennerian vaccine of US troops
- 1919: Citizens outraged that Woodrow Wilson permits smallpox vaccination of Armed Forces
- 1980: WHO declares Earth free of smallpox
- 1984: DoD restricts vaccination to recruits at basic training
  Policy intermittent: shortage of VIG, HIV testing begins
- 1990: DoD “temporarily discontinues” SMA vaccinations
- 2002: ~ 60% of AD personnel never vaccinated against smallpox; almost whole force is susceptible to infection

Smallpox Vaccine

FDA recently licensed a limited supply of smallpox vaccine made by Wyeth Laboratories, called Dryvax® .

- **The vaccine is made from virus called *vaccinia*, which is another "pox"-type virus related to smallpox**
- **The vaccine helps body develop immunity to smallpox. The vaccine does not contain smallpox virus and cannot spread smallpox**
- **This same vaccine given to millions of Americans, including Service Members during World War I, World War II, and until 1980s**
- **Vaccine used for Service Members passes all tests required by Food and Drug Administration (FDA)**
- **Smallpox vaccine was very first vaccine (1796) and has been used successfully for over 200 years**

Exemptions to Vaccination

Medical exemptions are given for medical conditions that increase the risk of serious adverse events

- Some people should not get smallpox vaccine, <u>except</u> under emergency situations. A Medical Exemption is given IF:
  - Your immune system is not working fully (due to disease, medication, or radiation)
  - You have or had eczema or atopic dermatitis
    - Red, itchy, scaling rash lasting more than 2 weeks, comes & goes
  - You have active skin diseases like:
    - Burns, psoriasis, contact dermatitis, chickenpox, shingles, impetigo, uncontrolled acne, until it clears up or is under control
  - You are pregnant
  - You have a close contact with someone with the risk factors above ↑
  - You are breastfeeding
  - You are allergic to smallpox vaccine or a component such as polymyxin B, streptomycin, tetracycline, neomycin, or latex
  - Women should avoid getting pregnant for 4 weeks after smallpox vaccination

Alternate Housing

- **People who have household contact with person with bar to smallpox vaccination shall:**
  - **either have alternative housing arrangements**
  - **or be exempted from smallpox vaccination until household-contact situation no longer applies (i.e., scab falls off)**

<u>Unacceptable</u>: Permitting vaccinated SM to reside in house, trailer, apartment, or similar close arrangements (e.g., "hot-bunking") with medically-barred contact

<u>Acceptable:</u>

- **Vaccinated SM uses alternate lodging (e.g., barracks, dorm room, tents) on military installation, vessel, or aircraft, or in contracted space**
- **Berthing barges, familiar to naval forces in shipyards**
- **Vaccinated SM <u>voluntarily</u> arranges for alternate lodging in privately-owned or managed space is acceptable, <u>if</u> commander has <u>reasonable</u> expectation that SM will comply with requirement**
- **Schedule vaccinations shortly before or during 21-day deployments or family separation**

Pregnancy & Infant Care

- **Defer routine smallpox vaccinations until after pregnancy:**
  - **When pregnant women get smallpox vaccine, pregnancy usually goes well**
  - **In rare cases, vaccine virus caused vaccinia infection of the fetus**
- **In an outbreak, personal benefit from vaccination may outweigh risks**
- **Take care to prevent spread of vaccine virus to infants < 1 year of age. Wash hands before handling infant (e.g., feeding, changing diapers)**
- **Smallpox vaccine not recommended for nursing mother, as it could put infant in close contact with mother's vaccination site**

HIV Infection

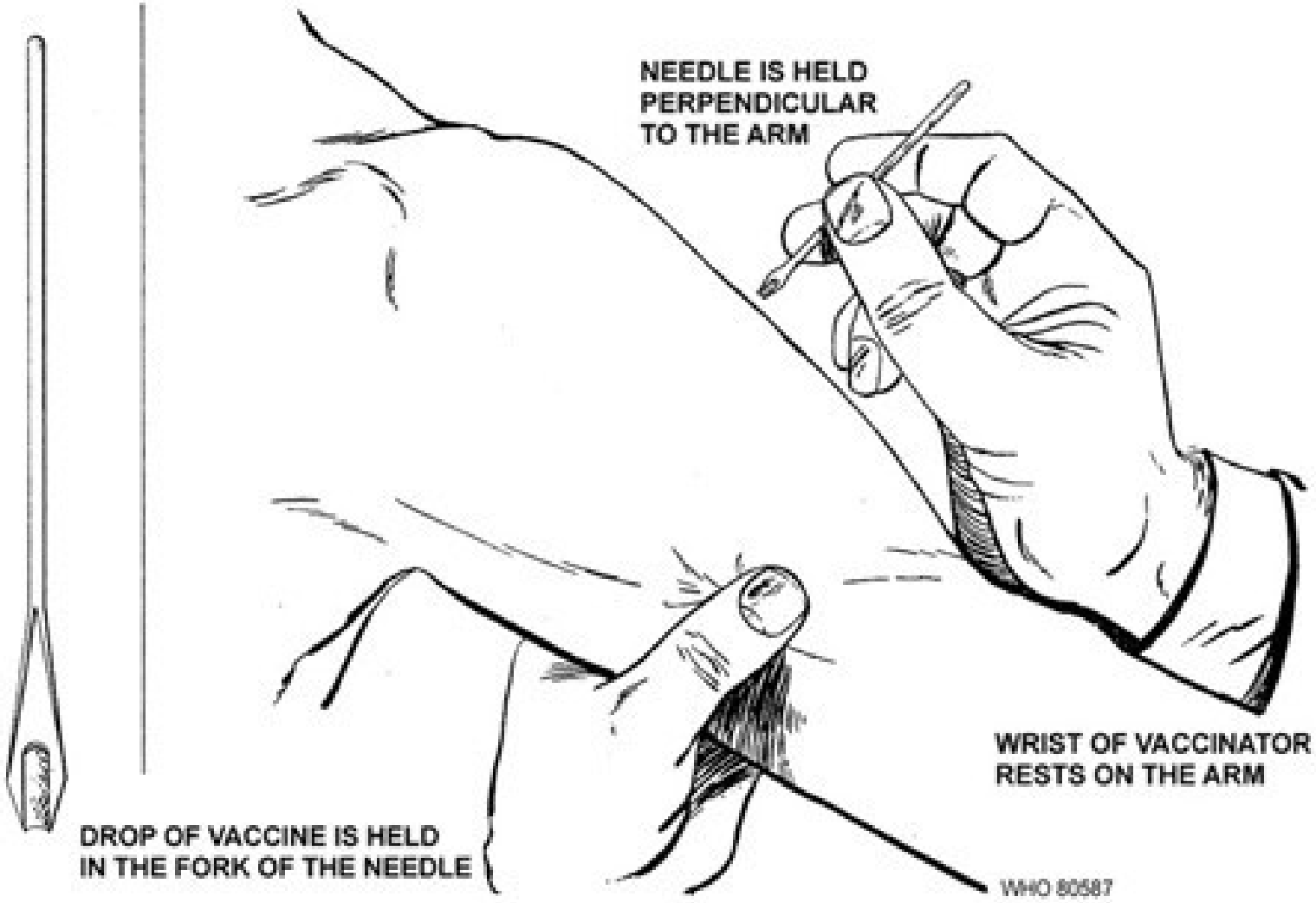
- **HIV infection is a bar to smallpox vaccination**
- **Service Members will be up-to-date with Service HIV-screening policies before smallpox vaccination**
- **DoD civilian employees and contractors will be offered HIV testing in confidential setting, with results before vaccination**
- **HIV testing recommended for anyone with history of risk factor for HIV infection, especially since last HIV test, and not sure of HIV-infection status**
- **Because known risk factors cannot be identified for some people infected with HIV, people concerned they could be infected should be tested**

CONTENTS: 100 STERILE NEEDLES
BIFURCATED VACCINATING NEEDLES
STERILE - SINGLE PATIENT USE ONLY
DO NOT RESTERILIZE
CAUTION: Federal law restricts this device to sale by or on the order of a physician.
Part Number: PB-01000-000-00
MANUFACTURED BY:
PRECISION MEDICAL PRODUCTS, INC.
DENVER, PA 17517 USA
www.pmp.net
TRIAL US

Vaccination Technique

- **Site: Skin over deltoid or posterior arm over triceps**
- **Cleanse site with soap & water, water only, then dry**
- **Use acetone or alcohol only if adequate time allowed to dry (or wipe site dry with gauze), to prevent inactivation**
- **Multiple-puncture technique uses bifurcated needle inserted vertically into the vaccine vial**
- **Primary (first) vaccination: 3 punctures, rapidly in 5 mm area, with strokes vigorous enough to cause a trace of blood after 15-20 seconds**
- **Revaccination: 15 punctures**
- **Evidence of prior smallpox vaccination (rough descending order of reliability):**
  - **medical documentation**
  - **characteristic Jennerian scar**
  - **entry into U.S. military service before 1984**
  - **birth in the United States before 1970**

Vaccination Technique


MULTIPUNCTURE VACCINATION BY BIFURCATED NEEDLE
NEEDLE IS HELD PERPENDICULAR TO THE ARM
WRIST OF VACCINATOR RESTS ON THE ARM
DROP OF VACCINE IS HELD IN THE FORK OF THE NEEDLE
WHO 80587

Successful Response to Vaccination

Day After Vaccination	Major Rxn, Primary (1st)	Major Reaction, for revaccinated	Equivocal: Delayed	Equivocal: All Other
Day 1			Erythema	
2			Erythema **	
3	Papule	Papule	No further rxn.	
4	(bump, pimple)			
5	Vesicle	Vesicle		
6	(blister)	Pustule, induration	Requires	Requires
7	Pustule --	or congestion	revaccination	revaccination
8	pus-filled blister	around		
9	(center	scab or ulcer		
10	(if previously			
11	vaccinated, may			
12	show 'induration'			
13	(hard swelling)			
14				
15	Scab			
16	(dark, then			
17	flesh-colored)			
18		* greatest erythema		
19		occurs after 3d day		
20	Scab falls off	after revaccntn;	** vesicles	
21	(day 14 to 21)	viral propagation.	infrequently	

See also:
www.bt.cdc.gov/training/smallpoxvaccine/reactions/normal.html#

Revaccination (Two Kinds)

<u>Revaccination, no take:</u>

- **No take: Give one revaccination with 15 punctures (jabs)**
- **Do not revaccinate more than once in short term**
- **People previously vaccinated not responding with visible skin lesion after two attempts: Consider medically immune**
- **Refer others for immunologic evaluation.**
- **<u>Revaccination, booster interval:</u>**
- **Revaccinate if > 3-5 y elapsed after first vaccination**
- **Revaccinate if > 10 y elapsed after later vaccination**

Timing vis-à-vis Other Vaccines

- **ACIP accepts administration of live and inactivated vaccines simultaneously or at any interval**
- **The only major restriction to combining vaccinations is with multiple live-virus vaccines**
  - **Either give simultaneously**
  - **or separated by 28 days or more**
- **Separate varicella (chickenpox) and smallpox (vaccinia) vaccinations by 28 days, to avoid confusing lesions**
- **Do not administer other vaccines near**

Side Effects—Serious

- In past, about 1,000 out of 1,000,000 people had reactions that were serious, but not life-threatening
  - Most involved vaccine virus elsewhere on body
  - Many preventable through better h*and washing!*
- 14 to 52 people out of 1,000,000 vaccinated for first time had potentially life-threatening reactions
  - 1 or 2 people of 1,000,000 may die as a result
- Serious side effects are generally more rare after revaccination but may require prolonged care
- To reduce risk of side effects, exempt people with immune problems or certain skin conditions

Serious Adverse Events

- **Serious reactions that may require medical attention:**
  - Accidental spread of virus to another body part or another person
  - Widespread vaccine rash where sores break out away from vaccination site (generalized vaccinia)
  - Allergic rash after vaccination (erythema multiforme)
- **Life-threatening reactions that need immediate attention:**
  - Serious skin rashes in people such as those with eczema or atopic dermatitis (eczema vaccinatum)
  - Ongoing infection of skin with tissue destruction (progressive vaccinia or vaccinia necrosum)
  - Postvaccinal encephalitis, inflammation of the brain

Adverse Reactions

- **See 16-panel CDC color brochure:**
  - ***Smallpox Vaccination: Methods & Reactions***

- **See also additional images at www.bt.cdc.gov/training/smallpoxvaccine/reactions**

Care of Vaccination Site

This woman touched her vaccination site, then touched her eye. She recovered with a scarred eyelid.

Vaccine virus remains at the site until scab falls off & can infect others

- Vaccine recipients need to be careful and informed
- Vaccine recipients need to educate close contacts about risk

1. **Don’t touch any vaccination site**
2. **If you touch it by accident, wash your hands right away**
3. **Don’t let others touch vaccination site or materials that covered it**
   - Wear gloves if assisting with site care
4. **Handle your own laundry/towels and place in hot soapy water directly**

Hand Washing & Hand Hygiene

- Wash hands with soap and warm water
  - rub hands together vigorously **for at least 10 seconds**
  - cover all surfaces of the hands and fingers
  - rinse hands with warm water
  - dry hands thoroughly with a **paper towel**
  - use paper towel to **turn off the faucet**
- Alcohol-based waterless hand rinse *e.g.,* CalStat®
  - Excellent alternative if hands are not visibly soiled
  - Apply product to palm and rub hands together, covering all surfaces of hands and fingers, until hands are dry
  - May have sticky feel after repeated use – wash hands with soap and water as needed

Hand Washing & Hand Hygien

To prevent accidental virus exposure t
the genital or rectal area, wash your
hands **BEFORE** using the bathroom

After using the toilet,

W

ds again.

Be extremely careful with your contact lenses!

- Wash hands thoroughly before you touch your eye or the lenses
- Wearing your glasses until site heals is preferred

Care of Vaccination Site

Follow these instructions carefully, or you could harm yourself or others. Ask questions if anything is unclear

- **Until your scab falls off**, avoid spreading vaccine virus to close contacts, particularly with people exempted from getting vaccinated
- **Do not share a bed, bunk, or cot with people who are exempted from vaccination**
  - Anyone is at risk for vaccine virus contact infection, so **Wash Your Hands**
- Do not share clothes, towels, linen, or toiletries
  - Anyone is at risk for vaccine virus contact infection, so **Wash Your Hands**

Care of Vaccination Site

Follow these instructions carefully, or you could harm yourself or others. Ask questions if anything is unclear.

- **Wear sleeves to cover the site**.
- Use bandages, if needed. Dispose of bandages in sealed or double plastic bags. You may carefully add bleach, alcohol, or soap, if desired
- **Keep site dry**, except normal bathing. Avoid rubbing. Avoid swimming or public bathing facilities
- **Launder** clothing, towels, and sheets in hot water with detergent or bleach.
- When the scab falls off, flush it down the toilet. Soap, alcohol, sunlight, chlorine, and bleach kill the virus.
- **Wash your hands – Hand washing, hand washing!**

Extra Cautions for Healthcare Workers

- Minimize contact with unvaccinated patients until scab falls off
- If contact essential and unavoidable, workers can continue to work with patients, including those with immunodeficiencies:
  - If site well-covered and thorough hand-hygiene maintained
  - Semi-permeable bandage (Opsite, Tegaderm, Cosmopore)
- To prevent accumulation of exudates, cover site with dry gauze, and then apply dressing over gauze
- Change dressing daily or every few days (according to type of bandaging and amount of exudate), eg, start or end of shift.
- Site-care stations: to monitor worker vaccination sites, promote effective bandaging, and encourage scrupulous hand hygiene
- Long-sleeve clothing can further reduce risk for contact transfer
- Most critical measure: Thorough hand-hygiene after changing bandage or any contact with site

Treatment of Adverse Events

- Be alert for serious, rare, adverse events after vaccination
- Consult as appropriate with allergy-immunology, infectious-disease, dermatology, neurology, or specialist(s).
- Some conditions respond to vaccinia immune globulin (VIG)
  - Eczema vaccinatum, progressive vaccinia, severe ocular vaccinia, severe generalized vaccinia
  - VIG not effective in treating post-vaccinial encephalitis
- VIG consists of human IgG antibody from people vaccinated with smallpox vaccine
- VIG available under IND protocol, by calling USAMRIID at 1-888-USA-RIID or 301-619-2257

Documentation

- **Screening: Record contraindications in medical record**
- **Vaccination: Individual medical records + computer**
- **Confirmation of successful vaccination:**
  - **Instruct all: Come back to clinic, if no characteristic lesion**
  - **Healthcare workers and response team members (traveling into smallpox outbreak area) will have take recorded in their health records**
  - **Other personnel should have vaccination take recorded in health records by medic or provider trained in vaccination evaluation**
- **Adverse events:**
  - **Medical records, VAERS, VHC access**
- **USD(P&R): Services will audit immunization tracking systems**

Adverse Event Reporting

- **Vaccine Adverse Event Reporting System (VAERS)**
  - **FDA and CDC review 100% of adverse-event reports submitted to VAERS**
  - **Anyone can submit a VAERS form**
  - **Reporting with medical help is preferred**
- **DoD requires a VAERS form submission for:**
  - **Loss of duty 24 hours or longer (≥ 1 duty day)**
  - **Hospitalization**
  - **Suspected vaccine vial contamination**
- **Other submissions encouraged**
- **Report to VAERS at www.vaers.org or call 800-822-7967**

Reserve Adverse-Event Care

- **Adverse events after DoD- or USCG-directed vaccinations are line-of-duty conditions**
- **Someone with an adverse event in a non-duty status possibly associated to any vaccination:**
  - **Seek medical evaluation at a DoD, USCG, or civilian medical treatment facility, if necessary**
  - **Must report the event to your unit commander or designated representative as soon as possible**
  - **See local medical department or squadron for guidance**
- **Commander will determine Line of Duty and/or Notice of Eligibility status, if required**

Franco-Prussian War

Franco-Prussian War, 1870-71:

- **Prussian Army of 800,000 men, revaccinated every 7 years:**
  - **Suffered 8,463 cases of smallpox**
  - **Fatality if infected -- 5.4%**
- **French Army, unvaccinated:**
  - **Suffered 125,000 cases of smallpox**
  - **Fatality if infected -- 18.7%**

Vaccines

Preserving the health and safety of our people are our top concerns

- **Vaccines will keep you and your team healthy**
- **Healthy troops complete their missions**
- **Vaccines:**
  - **Shield you from dangerous germs**
  - **Keep units fit to fight**
  - **Help you return home safely**
- **Vaccines saved more lives than any other medical invention, more than antibiotics or surgery. Only clean water has saved more lives**

Vaccine Safety

- Carefully read & complete screening form
  - You are helping accurately document that it is safe to give you the vaccine
- Ask questions if you are unsure
- Contact family members who may know about childhood history of recurrent rashes like eczema
- Talk to close contacts and family members about the vaccination program and safety precautions
- Ask for assistance at any point, if needed by you or your close contacts or if you have safety concerns

Information Sources

- Chain of Command
- Website: www.smallpox.army.mil
- E-Mail: vaccines@amedd.army.mil
- Toll-Free: 877.GET.VACC
- CDC National Immunization Hotline: 800.232.2522
- CDC Bioterrorism Information: www.bt.cdc.gov
- Walter Reed Vaccine Healthcare Center, for help with complicated adverse-event management: 202.782.0411
  - Askvhc@amedd.army.mil www.vhcinfo.org
- Information for Civilian Healthcare Providers: The Military Treatment Facility (MTF) where the member is enrolled, OR contact The Military Medical Support Office (MMSO) 888-647-6676 if the member is not enrolled to an MTF.